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## Audience Segmentation in Extension Horticultural Programs

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# Audience Segmentation in Extension Horticultural Programs

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**Abstract.** Cluster analysis was used to segment horticulture clientele using data from a needs assessment. Gardeners were segmented into two groups based on their horticulture practices. These groups were described using several factors including age and time spent maintaining different garden areas. Results from this study indicate the importance of considering the target audience prior to design and implementation of a gardening certificate program.

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## INTRODUCTION

Needs assessments serve a pivotal role in enabling Extension professionals to better understand the needs and interests of clientele (Caravella, 2006). Prior to implementation of a new program, it is important to identify the target audience and design program features to meet the audience's specific needs (Skelly et al., 2014). Since the early 1970s, Master Gardener (MG) programs have been the cornerstone of many Extension horticulture programs. Nationally, the program curriculum has remained fairly standard, although some content differences exist between geographic locations (Moore & Bradley, 2015). In addition to MG trainings, Salt Lake County Extension offers public gardening classes and provides MG volunteers to populate educational booths during public events. Since the Utah State University (USU) Extension MG program follows a statewide manual with established chapters, the topics have remained standard and consistent from year to year. However, topics requested by clientele at public gardening classes and public events change based on audience interest as well as other factors, such as time of year and specific preferences in gardening practices (i.e., organic vegetable gardening).

A programmatic needs assessment was developed to identify topics for designing a new gardening certificate program. The purpose of the new certificate program was to offer Extension horticulture programs to beginning and experienced gardeners who sought to implement learned practices in their own yards and gardens without a volunteer service requirement. A sizeable MG program currently exists in Salt Lake County with approximately 250 active volunteers. This robust program supplies approximately 5,000

volunteer service hours annually toward Extension-led programs; hence, the goal of the new certificate program was not to recruit and train additional volunteers for horticulture outreach. Prior studies tailored educational programming/activities through audience segmentation based on clientele needs (Chaudhary et al., 2019; Kratsch et al., 2017). Cluster analysis is commonly used to segment audiences to describe differences or identify relevant relationships between those segments (Skelly et al., 2014).

## PURPOSE AND OBJECTIVES

Audience segmentation allows program planners to tailor their programming activities to meet the specialized needs of different target populations (Monaghan et al., 2013). Therefore, this study sought to segment audiences of horticulture programs of USU Extension to better understand and meet clientele needs in future horticultural programming. Objectives of this study were to (a) segment participants of horticulture programming based on their gardening practices and (b) describe the major differences between audience segments.

## METHODS

In 2019, horticulture faculty in Salt Lake County collected needs assessment data via pen and paper surveys of clientele preferences and gardening habits at several Extension outreach events. Surveyed audiences included public gardening class participants (March to June, n = 171), visitors of a garden information booth at a large home and garden show

(March,  $n = 85$ ), and MG students who completed the training program in 2019 (April,  $n = 94$ ). The survey was pilot tested in 2018, and no changes were made to the pilot instrument. It became evident that data from the needs assessment could be useful in identifying horticulture topics of interest for design of a new gardening certificate program.

The main research question was, did interest in gardening topics differ between participants? Cluster analysis was used to group participants into segments (i.e., target audiences). Then, differences were described between those segments using a series of chi-squared correlations. A combination of hierarchical and  $k$ -means cluster analysis was used to segment audiences of USU Extension horticulture classes. As a hybrid hierarchical- $k$ -means clustering method (Chen et al., 2005), an agglomerative hierarchical cluster analysis was first used to determine the optimal number of clusters ( $k$ ) in the data. Then, a  $k$ -means cluster analysis was used to group individuals into respective clusters. The hybrid approach was appropriate since it provided an optimal number of non-overlapping clusters. Respondents were clustered based on their gardening practices (13 items). SPSS was used to analyze the data.

## RESULTS

### HORTICULTURE PRACTICES OF THE SAMPLE

Table 1 shows the practices and learning interests of the sample population. The 13 horticulture practices in the instrument were provided to all client groups. For each practice, respondents were asked to indicate one of three options next to each practice (i.e., compost) as follows: (a) I do not currently and do not plan to do this, (b) I do not currently but want to learn how, or (c) I currently do this. The most common practices among all respondents were growing organic fruits and vegetables (52%), attracting pollinators to their gardens (47%), composting (45%), and selecting good plant choices for Utah (45%). Respondents were mostly interested in learning about testing their garden soil (74%), attracting natural enemies to their garden (61%), controlling insect pests organically (61%), and maintaining a water-wise garden (61%). In contrast, most respondents did not practice and did not plan to practice keeping backyard chickens (52%) or keeping honeybees (48%).

### OBJECTIVE (A): AUDIENCE SEGMENTATION BY HORTICULTURAL PRACTICES

Participants were segmented based on 13 variables related to gardening practices. Gardening practices were identified by USU Extension horticulture faculty as topics of common interest by clientele at public gardening classes and public events. First, the agglomeration table of a hierarchical cluster analysis indicated two clusters was the logical solution. Therefore, a  $k$ -means cluster analysis was used to assign

observations to two clusters or audience segments. Since all 13 variables of horticultural practices were measured on a shared ordinal scale, standardized  $z$  scores were not generated before  $k$ -means clustering. The cluster analysis reduced the sample based on respondents' current horticultural practices and willingness to learn new practices—participants who did more practices and/or were willing to learn more (i.e. higher cluster centers) compared to those who were not willing to adopt new practices and/or learn more about those practices (i.e. lower cluster centers). The analysis revealed all cluster centers for both clusters were different, indicating a difference in horticultural practices between each cluster. In other words, the cluster analysis was successful in reducing the sample into distinct groups based on their practices/willingness to learn. Therefore, observations belonging to the cluster with higher cluster centers (participants who did more gardening practices and/or were willing to learn more) were referred to as *Avid Gardeners*. In contrast, observations belonging to the cluster with lower cluster centers (participants with lower practices/willingness to learn) were referred to as *Hobby Gardeners*. Table 2 shows the descriptive summary of clusters by participant type. The majority of Master Gardeners (68%), home and garden show participants (58%), and public class participants (54%) were clustered as Avid gardeners.

Results of chi-squared analyses in Table 3 show the differences in horticultural practices between avid and hobby gardeners. The results indicate there were statistically significant differences in all horticultural practices between avid and hobby gardeners. The top five differences related to keeping honeybees, starting seeds indoors, keeping backyard chickens, growing in a greenhouse, and composting. With respect to keeping honeybees, 71% of avid gardeners wanted to learn about the practice, while 10% already kept honeybees. In contrast, only 13% of hobby gardeners wanted to learn about beekeeping, while none currently kept honeybees. For indoor seed starting, about 60% of avid gardeners already started their own seeds indoors, compared to only 8% of hobby gardeners. For rearing backyard chickens, about 48% of avid gardeners wanted to learn about keeping backyard chickens and 24% were already doing this practice. However, only 15% of hobby gardeners wanted to learn about keeping backyard chickens, and none currently had backyard chickens. Another major difference between avid and hobby gardeners was their willingness to learn about greenhouses. About 78% of avid gardeners wanted to learn about greenhouses, while only 36% of hobby gardeners were interested in learning about greenhouses.

### OBJECTIVE (B): BACKGROUND DIFFERENCES BETWEEN AUDIENCE SEGMENTS

Results in Table 4 show differences between avid and hobby gardeners based on pre-defined demographic characteristics

## Audience Segmentation in Extension Horticultural Programs

**Table 1.** Current Practices of Respondents (n = 246)

Practice	Status of Practice	%
Keep honeybees	I do not [practice], and do not plan to	48
	I do not, but want to learn	46
	I currently do this	6
Start my own seeds indoors	I do not and do not plan to	18
	I do not, but want to learn	44
	I currently do this	38
Keep backyard chickens	I do not and do not plan to	52
	I do not, but want to learn	34
	I currently do this	14
Grow in a greenhouse	I do not and do not plan to	33
	I do not, but want to learn	60
	I currently do this	7
Compost	I do not and do not plan to	11
	I do not, but want to learn	44
	I currently do this	45
Attract natural enemies to my garden	I do not and do not plan to	21
	I do not, but want to learn	61
	I currently do this	18
Control insect pests organically	I do not and do not plan to	9
	I do not, but want to learn	61
	I currently do this	30
Attract pollinators to my garden	I do not and do not plan to	4
	I do not, but want to learn	49
	I currently do this	47
Grow organic fruits and vegetables	I do not and do not plan to	11
	I do not, but want to learn	37
	I currently do this	52
Maintain healthy garden soil	I do not and do not plan to	3
	I do not, but want to learn	53
	I currently do this	44
Test my garden soil	I do not and do not plan to	13
	I do not, but want to learn	74
	I currently do this	13
Select good plant choices for Utah	I do not and do not plan to	1
	I do not, but want to learn	54
	I currently do this	45
Maintain a water-wise garden	I do not and do not plan to	3
	I do not, but want to learn	61
	I currently do this	36

**Table 2.** Percentage of Avid and Hobby Gardeners Amongst Surveyed Participants

Participant type	%	
	Avid gardeners (n = 144)	Hobby gardeners (n = 102)
Home and garden show	58	42
Master Gardener students	68	32
Public class participants	54	46

and landscaping routines. Based on the chi-squared tests, there were statistically significant differences between avid and hobby gardeners based on age ( $X^2 = 15.58$ ,  $p < 0.01$ ), time spent on lawn ( $X^2 = 11.44$ ,  $p < 0.01$ ), and time spent on edible gardens ( $X^2 = 18.91$ ,  $p < 0.001$ ). With respect to age, avid gardeners were younger compared to hobby gardeners. Most avid gardeners (57%) were less than 44 years old. Meanwhile, most hobby gardeners (59%) were older than 44 years. Also, avid gardeners spent less time taking care of their lawns compared to hobby gardeners. While 54% of hobby gardeners spent between 5 and 15 hours each month in lawn care, 50% of avid gardeners spent less than five hours doing the same each month. However, avid gardeners spent significantly more time on edible gardens per month compared to hobby gardeners. About 49% of avid gardeners spent over 16 hours a month on their edible gardens. In contrast, only 23% of hobby gardeners spent over 16 hours a month on edible gardens.

### DISCUSSION

Our study sought to identify target audiences based on segments of horticultural clientele to inform the design of a gardening certificate program. Cluster analysis proved to be an effective tool for analyzing needs assessment data because we were able to segment clients based on their horticultural practices and identify significant differences between those segments. Our results indicate it is important to consider the target audience carefully, since the analysis revealed two distinct segments of clientele, referred to as avid and hobby gardeners. We identified differences between these groups to inform the design and implementation of the new gardening certificate program.

The results of this study can be used to create program content for courses targeted to difference audiences. For example, a stand-alone lawn maintenance class could be marketed to hobby gardeners who tend to spend more time maintaining lawn spaces than avid gardeners. Hobby gardeners did fewer gardening practices and were less willing to learn about new practices, so this audience would likely be less interested in participating in a multiclass certificate program. An edible gardening series could be marketed to avid

# Wagner, Narine, and Hales

**Table 3.** Difference in Practices Between Avid and Hobby Gardeners

Practice	Status	%		X <sup>2</sup>	v
		Avid (n = 144)	Hobby (n = 102)		
Keep honeybees	I do not and do not plan to	19	87	110.74**	0.67
	I do not, but want to learn	71	13		
	I currently do this	10	0		
Start my own seeds indoors	I do not and do not plan to	3	44	95.78**	0.62
	I do not, but want to learn	37	48		
	I currently do this	60	8		
Keep backyard chickens	I do not and do not plan to	28	85	80.42**	0.57
	I do not, but want to learn	48	15		
	I currently do this	24	0		
Grow in a greenhouse	I do not and do not plan to	12	62	68.98**	0.53
	I do not, but want to learn	78	36		
	I currently do this	10	2		
Compost	I do not and do not plan to	3	25	42.04**	0.41
	I do not, but want to learn	40	54		
	I currently do this	57	22		
Attract natural enemies to my garden	I do not and do not plan to	9	36	40.29**	0.41
	I do not, but want to learn	64	60		
	I currently do this	27	4		
Control insect pests organically	I do not and do not plan to	1	20	35.22**	0.38
	I do not, but want to learn	59	66		
	I currently do this	40	15		
Attract pollinators to my garden	I do not and do not plan to	0	11	31.87**	0.36
	I do not, but want to learn	40	60		
	I currently do this	60	29		
Grow organic fruits and vegetables	I do not and do not plan to	3	22	28.22**	0.34
	I do not, but want to learn	35	42		
	I currently do this	62	35		
Maintain healthy garden soil	I do not and do not plan to	1	8	25.73**	0.32
	I do not, but want to learn	42	65		
	I currently do this	57	27		
Test my garden soil	I do not and do not plan to	7	26	24.15**	0.31
	I do not, but want to learn	73	70		
	I currently do this	20	5		
Select good plant choices for Utah	I do not and do not plan to	0	2	12.48*	0.23
	I do not, but want to learn	46	65		
	I currently do this	54	33		
Maintain a water-wise garden	I do not and do not plan to	1	6	12.29*	0.22
	I do not, but want to learn	56	69		
	I currently do this	43	26		

Note. \* $p < 0.01$ , \*\* $p < 0.001$ .

## Audience Segmentation in Extension Horticultural Programs

**Table 4.** Background Differences Between Avid and Hobby Gardeners

Variable	Level	%		X <sup>2</sup>	v
		Avid (n = 144)	Hobby (n = 102)		
Gender	Male	33	26	1.39	0.08
	Female	67	74		
Age	18–24	4	0	15.58*	0.25
	25–34	30	14		
	35–44	23	27		
	45–54	19	20		
	55–64	13	24		
	65 or older	11	15		
Class type	Public	48	58	3.46	0.12
	Master Gardener	32	21		
	H&G	20	21		
Info-seeking behavior	Only research-based information	9	2	5.12	0.15
	Only locally relevant information	20	23		
	Both	70	69		
Time spent on lawn	< 5 hours	50	32	11.44*	0.23
	5–15 hours	40	54		
	16–25 hours	3	9		
	> 25 hours	7	5		
Time spent on trees and shrubs	< 5 hours	67	67	.28	0.04
	5–15 hours	24	23		
	16–25 hours	4	5		
Time spent on flower-beds	> 25 hours	5	5	3.03	0.11
	< 5 hours	30	38		
	5–15 hours	45	41		
	16–25 hours	20	13		
Time spent on edible garden	> 25 hours	5	7	18.91**	0.29
	< 5 hours	15	34		
	5–15 hours	36	43		
	16–25 hours	29	16		
Money spent	> 25 hours	20	7	2.30	0.10
	< \$500	37	41		
	\$500–999	39	40		
	\$1000–2,499	21	15		
	\$2500–4,999	2	3		
	> \$5000	1	0		

Note. \* $p < 0.01$ , \*\* $p < 0.001$ .

gardeners, and classes on less common gardening practices (such as keeping honeybees and backyard chickens) would likely be well-attended by this audience. Another consideration might be the amount of time each target audience is willing to spend on their yard and garden tasks. For example, if hobby gardeners spend an average of 5 to 15 hours per month on lawn care, class content should be designed to 1) be performed in this time range, and perhaps 2) identify ways hobby gardeners can spend less time maintaining their lawn spaces. In contrast, avid gardeners tend to spend more time maintaining edible spaces and are more willing to learn gardening practices than hobby gardeners. Therefore, time saving tips for edible gardening are probably less important for the avid gardener audience. Due to an increased willingness to learn new practices, avid gardeners might be more likely to attend a class series or workshop that combines instruction on multiple gardening practices of high interest to them; for example, a seed starting and greenhouse series that explores starting, growing, transplanting, and hardening off garden seedlings. In contrast, hobby gardeners would probably be more attracted to an a la carte class option, as this audience tends to be less willing to learn new gardening skills beyond specific practices.

While we anticipated a fairly equal split between hobby and avid gardeners for home and garden show and public class participants, we did not expect the divide between MGs. It was anticipated that the MG audience would be predominantly avid gardeners due to the extensive and comprehensive 14-week training program. Results from this study indicate hobby gardeners tend to be less willing to learn about new gardening practices. Two possibilities for the enrollment of hobby gardeners in the MG program are 1) there was not another option more tailored to their gardening interests and 2) they decided to take the program as a companion (spouse/friend) to an avid gardener. A less comprehensive class offering might be well received by hobby gardeners in the MG audience.

## CONCLUSION

Consistent with the literature on audience segmentation, cluster analysis was an effective technique for our programmatic needs assessment data because distinct differences were found between segments (i.e., avid and hobby gardeners). As a result, the gardening certificate program should be designed to meet the specific needs of these two groups. Extension horticulture professionals should consider a variety of program structures, such as stand-alone classes, workshops, and training programs to attract different target audiences. Extension professionals should carefully analyze their target audiences and create programs that meet the needs of those audiences. Cluster analysis is one method professionals can use to identify existing audiences and tailor programming to

meet the needs of difference target audiences. It is important we understand our audiences given overall demographic changes and new audiences.

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